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Technology adds to students' math comprehension

Posted By [mprabhu](#) On March 17, 2010 @ 10:35 pm In [Curriculum](#), [Research](#), [Technologies](#), [Top News](#), [eClassroom News](#) | [1 Comment](#)



Research suggests the use of tools that enhance visual learning, such as the INTERWRITE Mobi, can help students learn math.

Recent studies from two different continents point to the value of education technology in helping students grasp important yet abstract math concepts—and in both studies, animations that allow students to visualize these concepts were central to the results.

In one research project, the use of interactive whiteboards to teach math in several schools in Great Britain was found to have a positive effect on student learning, according to a three-year study conducted by researchers at Lancaster University.

In the other project, software that takes a visual approach to teaching math contributed to double-digit gains in the test scores of several Orange County, Calif., elementary students.

Technology helps bring math alive

The U.K. study explored how the introduction of RM MathsAlive into mathematics classrooms would affect teaching and learning. The Maestro Project launched in 2003 with the participation of 27 schools, and it followed the progress of students and teachers from year seven to year nine.

MathsAlive offers a wide range of resources for using interactive whiteboards to teach math topics, including resources created to meet each of the specific objectives in Britain's Secondary National Strategy framework for math instruction.

At the end of year nine, more than 80 percent of the 426 students surveyed said they believed they could learn new things in mathematics more easily than at the start of year seven, with 71 percent of students reporting that they thought it was easier to remember things when they used the interactive whiteboard.

"The results from a student questionnaire ... suggest that, in many cases, the use of the resources was having a positive impact on student enjoyment, motivation towards learning, and perceptions about mathematics," the report says.

Elizabeth Bates, head of mathematics at the Deanery High School in England, said using MathsAlive resources along with interactive whiteboards in math classrooms has had a positive impact on student achievement.

"The students have better and sounder knowledge of the concepts of mathematics. The animations are so powerful; bisecting an angle becomes a really visual experience," Bates said.

The report found that students often referred to the roles of visual imagery, animations, and videos in helping them understand key concepts.

"Moving imagery was clearly a key means for [students] to 'see what is meant,' rather than their trying to 'imagine what is meant' when it is just described by teachers," the report found.

Students weren't the only ones affected by using the whiteboard technology; many teachers reported that their approach to instruction shifted as well.

"Some reported that the focus of the lesson had changed, moving away from them as the teacher, towards the resources they were using. Some teachers felt the [MathsAlive] resources enabled a more collaborative environment to emerge, where they were working with students to construct problems and devise methods to solve them," the study found.

The Maestro Project also found that the whiteboards maintained students' attention while stimulating a number of sensory routes, encouraging the reception of ideas or knowledge.

"Many teachers believed that [students] were able to make mathematical connections between concepts more effectively, because visual imagery improved knowledge retention," the report stated.

Alec Swift at the Gillotts School was able to witness the transformation of his students throughout the study, as he taught them from year seven through year nine using MathsAlive curriculum resources almost exclusively.

"Their interest and enthusiasm has been caught, and many have expressed an interest in continuing maths beyond [the General Certificate of Secondary Education]. I am really pleased with the effects of MathsAlive and hope to continue using it," he said. (The General Certificate of Secondary Education is an academic qualification awarded in a specified subject, generally taken in a number of subjects by students ages 14 to 16 in the U.K.)

U.S. educators corroborated the results of the U.K. study, describing similar results from teaching with interactive whiteboards in their own classrooms.

Oliver Martin, an algebra teacher at Lehigh Senior High School in Florida, said he uses eInstruction's INTERWRITE Mobi, an interactive whiteboard tablet from which content can be projected onto any surface, along with eInstruction's CPS Pulse, a student response system that captures real-time assessment data to gauge student comprehension during instruction.

"I use [the Mobi] as a portable interactive whiteboard. Moving freely about the room, sitting at my desk, or sitting with a group of students, the entire room can view what is going on at that moment," he said.

Martin noted that high school students are often reluctant to go to the board at the front of the classroom to work out math problems for the entire class—but they are willing to demonstrate a problem from their own desk, he said.

"My favorite and most pedagogically valuable tool is the Mobi used in conjunction with clickers. When I am completing a unit, I present the students with questions on the material we just

covered. As the students complete the problems and enter their answers, the responses appear on the small LCD screen at the top of the Mobi tablet," he said.

"I immediately know who understands the concept. I immediately know who didn't get it, and I received this information quietly and unobtrusively, without asking for an embarrassing show of hands."

Visual learning helps California students succeed

At the 2010 Florida Education Technology Conference (FETC) in Orlando earlier this year, the nonprofit MIND Research Institute discussed findings from a 2009 study suggesting that elementary students using the group's ST Math software experienced dramatic learning gains.

Based on decades of neuroscience research at the University of California, Irvine, ST Math is a supplemental program for students in grades K-5 that also takes a visual approach to learning. The software taps into the brain's innate "spatial temporal" reasoning ability to visualize and solve math concepts and problems, its makers say.

Students solve math problems presented as visual puzzles, before they are ever introduced to abstract math language and symbols. Through a carefully engineered sequence of fun-to-play software "games," students work at their own pace to solve increasingly difficult problems that eventually require them to think multiple steps ahead in space and time—and they receive instant feedback about why a solution works or doesn't.

More than 15,000 students enrolled in 64 elementary schools are taking part in the Orange County Math Initiative, a five-year community partnership involving Orange County schools, leaders in the business community, UC Irvine, and MIND. The 64 participating schools are in the lowest-performing 30 percent of California elementary schools; 80 percent of their students qualify for free or reduced-price lunches, and 60 percent are English-language learners.

Yet the percentage of these students who tested at the Proficient or Advanced level on California's most recent state exam increased by more than 12 percentage points, MIND said, compared with the state average of 4.5 points.

"We've seen what can be done with the benefit of a tool like this," said Andrew R. Coulson, president of MIND's education division.

Editor Dennis Pierce contributed to this report.

Links:

[Maestro Project study](#) ^[1]

[MIND Research Institute](#) ^[2]

Note to readers:

*Don't forget to visit the **Enterprising Instruction** resource center. Using data to inform instruction is one of the Obama administration's keys to effective school reform, and technology is helping a growing number of educators accurately identify their students' needs and deliver targeted—and timely—interventions when appropriate. To benefit fully from such a data-driven instructional model, schools need a system for tying their instructional and administrative processes together—in effect, bringing an Enterprise Resource Planning (ERP) approach to the classroom. Go to:*

[*Enterprising Instruction*](#)

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[1] Maestro Project study:

http://www.rm.com/_RMVirtual/Media/Downloads/Final_Maestro_Project_Paper.pdf

[2] MIND Research Institute: **<http://www.mindresearch.net>**

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